

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts with (i) ligands comprising tertiary phosphines, (ii) ligands comprising tertiary phosphanes, or comprising (iii) bidentate ligands with a tertiary amine group and a phosphine group, or (iv) bidentate ligands with two tertiary phosphine groups as complexing groups, whereby the bidentate ligands form together with a metal atom a five- to ten membered ring.

2. (Previously Presented) The process according to claim 1, wherein the polar reaction medium is an aqueous or alcoholic reaction medium.

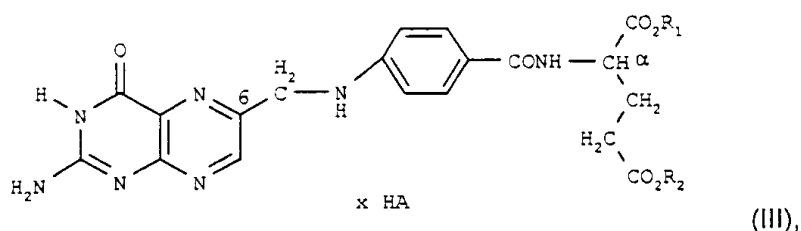
3. (Previously Presented) The process according to claim 1, wherein the pterin derivatives used are folic acid, folic acid salts, folic acid esters, folic acid ester salts or dihydro forms thereof for hydrogenation with hydrogen in the presence of a hydrogenation catalyst, the hydrogenation carried out at elevated pressure in the presence of metal complexes dissolved in the reaction medium as hydrogenation catalysts, with the proviso that in the event of using folic acid, carboxylic acids thereof or dihydro forms

thereof the reaction medium is aqueous, and in the event of using folic acid esters, folic acid ester salts or dihydro forms thereof the reaction medium is an alcohol.

4. (Previously Presented) The process according to claim 1 for the asymmetric hydrogenation of prochiral pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts, the metal complexes containing chiral ligands.

5. (Previously Presented) The process according to claim 4 for the asymmetric hydrogenation of folic acid, folic acid salts, folic acid esters, folic acid ester salts or dihydro forms thereof as pterin derivatives, with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out at elevated pressure in the presence of metal complexes dissolved in the reaction medium as hydrogenation catalysts, the metal complexes containing chiral ligands, with the proviso that where folic acid, carboxylic acid salts thereof or dihydro forms are used, that the reaction medium is aqueous, and where folic acid esters, folic acid ester salts or dihydro forms thereof are used, the reaction medium is an alcohol.

6. (Currently Amended) The process according to claim 5, wherein the folic acid ester salts satisfy formula III and are in the form of their enantiomers or mixtures,



in which

one of R<sub>1</sub> or R<sub>2</sub> is H, and the other one of R<sub>1</sub> or R<sub>2</sub> is a monovalent hydrocarbon radical or a heterohydrocarbon radical attached via a carbon atom, wherein the heterohydrocarbon radical contains one or more heteroatoms selected from the group consisting of -O-, -S-, and -N-, or

both R<sub>1</sub> and R<sub>2</sub> independently of one another represent a monovalent hydrocarbon radical or a heterohydrocarbon radical attached via a carbon atom, with wherein the heterohydrocarbon radical contains one or more heteroatoms selected from the group consisting of comprising -O-, -S-, and -N-,

HA stands for a monobasic to tribasic inorganic or organic acid, and

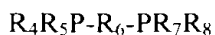
x denotes an integer from 1 to 6 or a fractional number between 0 and 6.

7. (Previously Presented) The process according to claim 6, wherein the acid HA in formula III is unsubstituted or substituted phenylsulphonic acid.
8. (Previously Presented) The process according to claim 1, wherein said process is carried out at a hydrogen pressure of 1 to 500 bars.
9. (Previously Presented) The process according to claim 1, wherein the temperature is 0 to 150<sup>0</sup> C.
10. (Previously Presented) The process according to claim 1, wherein the molar ratio of substrate to catalyst is 10 to 100,000.
11. (Previously Presented) The process according to claim 1, wherein the aqueous reaction medium is water or water in admixture with an organic solvent.
12. (Previously Presented) The process according to claim 2, wherein the alcoholic reaction medium is an alcohol, or an alcohol in admixture with an organic solvent.
13. (Previously Presented) The process according to claim 1, wherein the metal complexes contain a d-8 metal comprising iridium, rhodium or ruthenium.

14. (Currently Amended) ~~The process according to claim 1~~ A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts with (i) ligands comprising tertiary phosphines, (ii) ligands comprising tertiary phosphanes, (iii) bidentate ligands with a tertiary amine group and a phosphine group, or (iv) bidentate ligands with two tertiary phosphine groups as complexing groups, whereby the bidentate ligands form together with a metal atom a five- to ten membered ring, wherein the metal complex contains achiral or chiral ditertiary diphosphines as ligand.

15. (Currently Amended) The process according to claim 14, wherein the reaction medium is an alcoholic reaction medium, wherein the ditertiary diphosphines for an alcoholic reaction medium are ones in which the phosphine groups are attached (a) to various carbon atoms of a hydrocarbon chain having 2 to 4 carbon atoms, or (b) directly via a bridging group  $-CR_aR_b-$  in the ortho positions of a cyclopentadienyl ring or to a cyclopentadienyl ring of a ferrocenyl, where  $R_a$  and  $R_b$  are the same or different and stand for H,  $C_1-C_8$  alkyl,  $C_1-C_4$  fluoroalkyl,  $C_5-C_6$  cycloalkyl, phenyl, benzyl, or phenyl or benzyl substituted with 1 to 3  $C_1-C_4$  alkyl or  $C_1-C_4$  alkoxy.

16. (Currently Amended) The process according to claim 14, wherein the reaction medium is an alcoholic reaction medium, wherein the diphosphines which can be used in an alcoholic reaction medium satisfy formula IV,

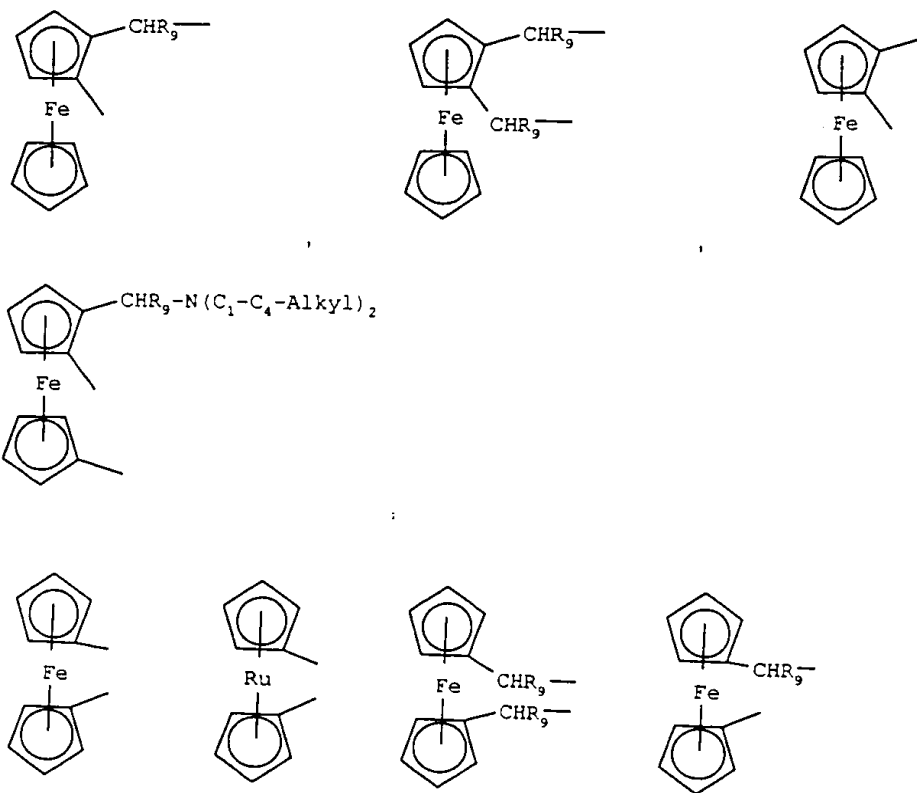


(IV)

in which

$R_4$ ,  $R_5$ ,  $R_7$  and  $R_8$  independently of one another represent a hydrocarbon radical with 1 to 20 carbon atoms, which is unsubstituted or substituted with halogen,  $C_1$ - $C_6$  alkyl,  $C_1$ - $C_6$  haloalkyl,  $C_1$ - $C_6$  alkoxy,  $C_1$ - $C_6$  haloalkoxy,  $(C_6H_5)_3Si$ ,  $(C_1-C_{12} \text{ alkyl})_3Si$ ,  $-NH_2$ ,  $-NH(C_1-C_{12} \text{ alkyl})$ ,  $-NH(\text{phenyl})$ ,  $-NH(\text{benzyl})$ ,  $-N(C_1-C_{12} \text{ alkyl})_2$ ,  $-N(\text{phenyl})_2$ ,  $-N(\text{benzyl})_2$ , morpholinyl, piperidinyl, pyrrolidinyl, piperazinyl,  $-\text{ammonium-}X_3^-$ ,  $-SO_3M_1$ ,  $-CO_2M_1$ ,  $-PO_3M_1$ , or  $-CO_2C_1-C_6 \text{ alkyl}$ , in which  $M_1$  represents an alkali metal or hydrogen and  $X_3^-$  is the anion of a monobasic acid; or  $R_4$  and  $R_5$ , and  $R_7$  and  $R_8$  respectively together denote tetramethylene, pentmethylenes, or 3-oxa-pentane-1,5-diyl, unsubstituted or substituted with halogen,  $C_1$ - $C_6$  alkyl or  $C_1$ - $C_6$  alkoxy; and  $R_6$  is  $C_2$ - $C_4$  alkylene, unsubstituted or substituted with  $C_1$ - $C_6$  alkyl,  $C_1$ - $C_6$  alkoxy,  $C_5$  or  $C_6$  cycloalkyl, phenyl, naphthyl, or benzyl; 1,2- or 1,3-cycloalkylene, 1,2- or 1,3-cycloalkenylenes, 1,2- or 1,3-bicycloalkylene or 1,2- or 1,3-bicycloalkenylenes with 4 to 10 carbon atoms, unsubstituted or substituted with  $C_1$ - $C_6$  alkyl, phenyl, or benzyl; 1,2- or 1,3-cycloalkylene, 1,2- or 1,3-cycloalkylene, 1,2- or 1,3-bicycloalkylene or 1,2- or 1,3-bicycloalkylene with 4 to 10 carbon atoms, unsubstituted or substituted with  $C_1$ - $C_6$  alkyl, phenyl, or benzyl, at whose 1 and/or 2 positions or at whose 3-position methylene or  $C_2$ - $C_4$  alkylidene is attached; 1,4-butylene substituted in the 2,3 positions with  $R_9R_{10}C(O)_2$ , and which in the 1 and/or 4 positions is unsubstituted or substituted with  $C_1$ - $C_6$  alkyl, phenyl, or benzyl, and where  $R_9$  and  $R_{10}$  independently of one another

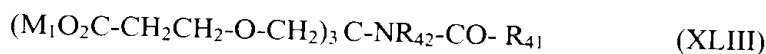
represent hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, phenyl or benzyl; 3,4- or 2,4-pyrrolidinylenes or methylene-4-pyrrolidine-4-yl whose nitrogen atom is substituted with hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, phenyl, benzyl, C<sub>1</sub>-C<sub>12</sub> alkoxy, C<sub>1</sub>-C<sub>8</sub> acyl, C<sub>1</sub>-C<sub>12</sub> alkylaminocarbonyl; or denotes 1,2-phenylene, 2-benzylene, 1,2-xylylene, 1,8-naphthylene, 2,2'-dinaphthylene or 2,2'-diphenylene, unsubstituted or substituted with halogen, -OH, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, phenyl, benzyl, phenyloxy or benzyloxy; or R<sub>6</sub> stands for a radical of the formulas



in which R<sub>9</sub> denotes hydrogen, C<sub>1</sub>-C<sub>8</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> fluoroalkyl, unsubstituted phenyl or phenyl substituted with 1 to 3F, Cl, Br, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy or fluoromethyl.

17. (Currently Amended) The process according to claim 14, wherein the reaction medium is an aqueous reaction medium, the ~~wherein~~ diphosphines ~~for an aqueous reaction medium~~ are ones that contain one or more water-solubilising polar substituents, which are attached either direct or via a bridging group to substituents of the phosphine groups.

18. (Currently Amended) The process according to claim 17, wherein the reaction medium is an aqueous reaction medium, ~~wherein~~ the diphosphines ~~for an aqueous reaction medium~~ are ones of formula XLIII,

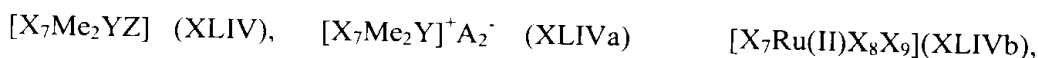


in which  $M_1$ , stands for H, an alkali metal cation or an ammonium cation,  $R_{42}$  denotes  $C_1$ - $C_4$  alkyl or and preferably H, and  $R_{41}$  is the monovalent radical of a chiral diteritary diphosphine, with the CO group being attached direct to a carbon or nitrogen atom of the diphosphine skeleton, or to an oxygen or nitrogen atom or to a carbon atom of a bridging group of the diphosphine skeleton.

19. (Currently Amended) ~~The process according to claim 1~~ A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes



that are soluble in the reaction medium are used as the hydrogenation catalysts with (i) ligands comprising tertiary phosphines, (ii) ligands comprising tertiary phosphanes, (iii) bidentate ligands with a tertiary amine group and a phosphine group, or (iv) bidentate ligands with two tertiary phosphine groups as complexing groups, whereby the bidentate ligands form together with a metal atom a five- to ten membered ring, wherein the hydrogenation catalysts are metal complexes of formulas XLIV, XLIVa and XLIVb,



in which

Y stands for monoolefin ligands or a diene ligand;

X<sub>7</sub> represents an achiral or chiral ditertiary diphosphine that forms a 5 to 7 membered ring with the metal atom Me<sub>2</sub> or Ru;

Me<sub>2</sub> denotes Ir(I) or Rh(I);

Z represents -Cl, -Br, or -I; and

A<sub>2</sub> is the anion of an oxy-acid or complex acid;

X<sub>8</sub> and X<sub>9</sub> are the same or different and have the meaning of Z and A<sub>2</sub>, or X<sub>8</sub>, and

X<sub>9</sub> stands for allyl or 2-methylallyl, or X<sub>8</sub> has the meaning of Z or A and X<sub>9</sub> stands for hydride.

20-28. (Cancelled)

29. (Currently Amended) A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts and wherein the polar alcoholic reaction medium is an alcohol, or an alcohol in admixture with an organic solvent.

30. (Previously Presented) A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts and wherein the metal complex contains achiral or chiral ditertiary diphosphines as ligand.

31. (Currently Amended) A process for the preparation of tetrahydropterin and tetrahydropterin derivatives by the hydrogenation of pterin and pterin derivatives with hydrogen in the presence of a hydrogenation catalyst, wherein the hydrogenation is carried out in a polar reaction medium and metal complexes that are soluble in the reaction medium are used as the hydrogenation catalysts wherein the metal complex contains achiral or chiral ditertiary diphosphines as ligand and wherein the reaction medium is an alcoholic reaction medium, the ditertiary diphosphines ~~for an alcoholic reaction medium~~ are ones in which the phosphine groups are attached (a) to various carbon atoms of a hydrocarbon chain having 2 to 4 carbon atoms, or (b) directly via a

bridging group  $-CR_aR_b-$  in the ortho positions of a cyclopentadienyl ring or to a different and stand for H,  $C_1-C_8$  alkyl,  $C_1-C_4$  fluoroalkyl,  $C_5-C_6$  cycloalkyl, phenyl, benzyl, or phenyl or benzyl substituted with 1 to 3  $C_1-C_4$  alkyl or  $C_1-C_4$  alkoxy.

32. (Currently Amended) The process according to claim 14, wherein the ditertiary diphosphines ~~are~~ are tertiary phosphino imines.